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We claim:

1. An optical sampling method, comprising:
receiving an optical data pulse and an optical sampling pulse;
5 directing first portions of the optical data pulse and the optical sampling pulse to
a first balanced detector with a first phase difference to obtain a first balanced electrical
signal;
directing second portions of the optical data pulse and the optical sampling pulse
to a second balanced detector with a second phase difference to obtain a second
10 balanced electrical signal; and
combining the first balanced electrical signal and the second balanced electrical
signal to obtain a sample signal associated with data pulse intensity.
2. The method of claim 1, wherein a difference between the first phase
15 difference and the second phase difference is about 90 degrees.
3. The method of claim 2, wherein at least one of the phase differences is
established by directing at least one of the second portion of the optical data pulse and
the second portion of the optical sampling pulse through an optical retarder.
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4. The method of claim 3, wherein the second portions of the optical data pulse
and the optical sampling pulse are directed to the optical retarder.
5. The method of claim 4, further comprising configuring the optical retarder to
25 have an axis that is substantially parallel to a polarization direction of one of the second
portion of the optical data pulse or the second portion of the optical data pulse.
6. The method of claim 5, wherein the optical retarder is a $\frac{1}{4}$ -wave retarder.

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7. The method of claim 2, wherein at least one of the phase differences is established by directing one of the second portion of the optical data pulse and the second portion of the optical sampling pulse to an optical delay line.

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8. The method of claim 2, wherein one of the phase differences is established by directing at least one of the second portion of the optical data pulse and the second portion of the optical sampling pulse to a thermooptic modulator.

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9. The method of claim 8, wherein a difference between the first phase difference and the second phase difference is about 90 degrees.

10. A sampling method, comprising:

dividing a sampling signal into first portion and a second portion;

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dividing a test signal into a first portion and a second portion;

mixing the first portion of the sampling signal and the first portion of the test signal in a balanced detector to produce a first balanced electrical signal;

establishing a selected phase difference between the second portion of the sampling signal and the second portion of the test signal based relative to a phase

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difference between the first portion of the sampling signal and the first portion of the data signal;

mixing the second portion of the sampling signal and the second portion of the test signal in a balanced detector to produce a second balanced electrical signal; and

combining the first balanced electrical signal and the second balanced electrical signal to obtain a combined signal associated with test signal intensity.

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11. The method of claim 10, wherein the selected phase difference is about 90 degrees.

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12. The method of claim 11, wherein the selected phase difference is based on an optical path length difference between a first optical path and a second optical path associated with the second portions.

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13. The method of claim 11, wherein the selected path difference is based on birefringence in a common optical path associated with the second portions.

14. An optical sampling system, comprising:
10 a data input configured to receive a test signal;
a sampling pulse input configured to receive a sampling pulse;
an optical system configured to produce a first combination of the data input and the sampling pulse and a second combination of the data input and the sampling pulse, wherein the first combination is associated with a first phase difference and the second
15 combination is associated with a second phase difference;
a first balanced detector and a second balanced detector configured to receive the first combination and the second combination, respectively, and produce a first balanced signal and a second balanced signal, respectively; and
a signal processing system configured to combine the first balanced signal and the
20 second balanced signal.

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15. The optical sampling system of claim 14, further comprising an optical modulator configured to establish at least one of the first phase difference and the second phase difference.

16. The optical sampling system of claim 14, further comprising a retardation plate configured to establish at least one of the first phase difference and the second phase difference.

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17. The optical sampling system of claim 13, wherein a difference between the first phase difference and the second phase difference is about 90 degrees.

5 18. An optical sampler, comprising:
a signal input configured to receive an test optical signal;
an optical detection system configured to combine the test optical signal with a
sampling pulse to produce a first balanced detector output associated with a first phase
difference and a second balanced detector output associated with a second phase
10 difference, wherein the first phase difference and the second phase difference differ by
about 90 degrees;
a controller configured to receive the first balanced detector output and the
second balanced detector output and produce a linear sampling signal; and
a memory configured to store a sample value based on the sampling signal.

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19. The optical sampler of claim 18, wherein the controller configured to
provide a variable time delay of the sampling pulse with respect to a period associated
with the test signal.

20 20. The optical sampler of claim 19, wherein the period is a bit interval.

21. The optical sampler of claim 18, wherein the optical detection system is
configured to combine the test optical signal with sampling pulses corresponding to a
plurality of delay times and to produce an associated first balanced detector output and
25 second balanced detector output, the controller is configured to produce corresponding
linear sampling signals, and the memory is configured to store sample values based on
the linear sampling signals.

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22. The optical sampler of claim 18, further comprising a display configured to exhibit the stored sample values as a function of the associated delay.

23. An optical sampling method, comprising:
- 5 receiving an optical data pulse and an optical sampling pulse;
dividing the optical data pulse and the optical sampling pulse into a first polarization component and a second polarization component;
directing first portions of the first polarization component of the optical data pulse and the first polarization component of the optical sampling pulse to a first
10 balanced detector with a first phase difference to obtain a first balanced electrical signal;
directing second portions of the first polarization component of the optical data pulse and the first polarization component of the optical sampling pulse to a second
balanced detector with a second phase difference to obtain a second balanced electrical
15 signal;
directing first portions of the second polarization component of the optical data pulse and the second polarization component of the optical sampling pulse to a third
balanced detector with a third phase difference to obtain a third balanced electrical
signal;
20 directing second portions of the second polarization component of the optical data pulse and the second polarization component of the optical sampling pulse to a
fourth balanced detector with a fourth phase difference to obtain a fourth balanced
electrical signal; and
combining the first, second, third, and fourth balanced electrical signals to
25 obtain a sample signal associated with data pulse intensity.

24. The method of claim 23, wherein the first and second polarization components are orthogonal.

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25. The method of claim 24, wherein the first and second polarization components are linear polarizations.

5 26. A method, comprising:

receiving an input optical signal that includes a first signal component associated with a first frequency distribution and a second signal component associated with a second frequency distribution;

10 selecting a sampling pulse having a spectral distribution based on either the first frequency distribution or the second frequency distribution;

directing the sampling pulse and the input optical signal to a linear optical sampling system; and

detecting an electrical sample signal associated with the first signal component or the second signal component.

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27. The method of claim 26, wherein the input optical signal is a wavelength multiplexed optical signal, and the first and second frequency distributions are associated with a first wavelength and a second wavelength, respectively.

20 28. The method of claim 26, wherein the input optical signal is an optical code-division multiplexed optical signal, and the first and second frequency distributions are associated with a first code word and a second code word, respectively.